GORDOVA, Z.A.; RYBALKINA, V.N.; ARAKELOVA, G.M.

Case of salmonellosis in the town of Dushanbe. Zdrav. Tadzh. 9 no.1:46 Ja-F '62. (MIRA 15:4)

1. Iz bakteriologicheskoy laboratorii Gorodskoy klinicheskoy infektsionnoy bol'nitsy g. Dushanbe (glavnyy vrach - A.A.Akilov).
(DUSHANBE--SALMONELLA)

ACC NR: AP7003418 SOURCE CODE: UR/9040/66/000/012/0022/0022

AUTHOR: Karpekin, V. (Engineer; Donetsk); Rybalko, A. (Engineer; Donetsk)

ORG: none

TITLE: Fireproof suit

SOURCE: Izobretatel' i ratsionalizator, no. 12, 1966, 22

TOPIC TAGS: fire protection, fire resistant material

ABSTRACT:

The authors and I. Volokhov, from the Central Scientific-Research Laboratory of Mine Rescue have developed a self-contained gas and heat protective suit (author certificate no. 180098). The coolant is liquid oxygen or liquid air. The gas produced in the cooling system is for breathing. It is fed in at a rate of 100 l/min. The upper part of the system is made from duralumin; it is doubled in the area of the head and chest. On the outside the suit is insulated with foamed polyurethane and covered with a glass reinforced plastic. The pants and sleeves are made of two layers of heat resistant fiber and a layer of glass wool. Liquid air can be fed into the suit through

Card 1/2 UDC: none

ACC NR: AP7003418

the gasline regardless of the position of the wearer. The first experimental suit is being tested; use of the suit makes it possible to work for 1 1/2 hr at 100C. Inside the suit, near the head and torso the temperature does not exceed 24C. The suit weighs 25 kg, but as the gas escapes its weight decreases to 15 kg. Orig. art. has: 1 figure.

SUB CODE: 11/ 06/ SUBM DATE: none/ ATD PRESS: 5113

Card 2/2

KULISHENKO, A.Z., inzh.; RYBALKO, A.M., inzh.; KISHTEV, V.P., inzh.;
KIRILYUK, L.V.

Automatic supply of molding sand with the use of radioisotopes.
Mashinostroenie no.6:58-59 N-D '64 (MIRA 18:2)

NAZAROV, S.N.; RYBALKO, A.N.

Longitudinal shifting of domes in Mesozoic sediments of Fergana as illustrated by the Khodzhiabad deposit. Dokl.AN Uz.SSR no.8:18-21 '59. (MIRA 12:11)

1. Uzbekskiy filial Vsesoyuznogo nauchno-issledovatel'skogo geologo-razvedochnogo neftyanogo instituta. Predstavleno akademikom AN UzSSR Kh.M.Abdullayevym.
(Fergana--Petroleum--Geology)

RYBALKO, A.N.

Our achievements. Zdrav. Bel. 8 no.6:57-58 Je'62. (MIRA 16:8)

1. Upravlyayushchiy aptekoy No.25 goroda Mar'ina Gorka.
(MAR'INA GORKA—PHARMACY)

L 08580-67 EWT(1) SCTB DD/RD

ACC NR: AP6011274 SOURCE CODE: UR/0413/66/000/006/0133/0133

AUTHORS: Karpokin, V. V.; Rybalko, A. P.; Volokhov, I. I.

33
B

ORG: none

TITLE: A self-contained gas-heat pressurized suit. Class 61, No. 180098 [announced by Central Scientific Research Laboratory for High-Altitude Rescue Matters (Tsentral'naya nauchno-issledovatel'skaya laboratoriya po gornospasatel'nomu delu)]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 6, 1966, 133

TOPIC TAGS: space suit, pressure suit, protective clothing

ABSTRACT: This Author Certificate presents a self-contained gas-heat protective space suit. The outfit consists of a suit of heat-resistant fabric with a rigid cuirass and helmet. A tank with a liquid gas, for example, oxygen, connects with the internal cavity of the space suit (see Fig. 1). The design provides normal breathing without regeneration of the exhaled air. An evaporation rate regulator is mounted on the tank. The regulator is a sylphon bellows connecting with the valve of the liquid gas supply. The inner cavity of the sylphon bellows connects with the atmosphere which is enclosed in the casing which connects with the space suit cavity. In order to automatically maintain a given temperature in the space suit a thermorelay is mounted on the tank. The thermorelay is designed in the form of an increased

Card 1/2 UDC: 614.895.5

L 08580-67

ACC NR: AP6011274

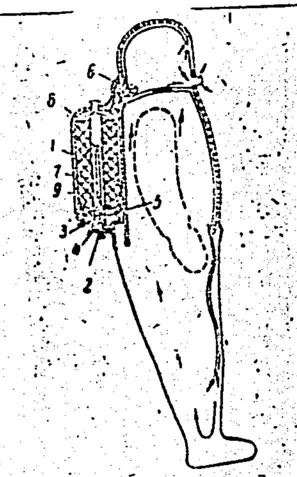


Fig. 1. 1 - tank with liquid oxygen; 2 - evaporation regulator; 3 - valve for the liquid gas supply; 4 - sylphon bellows; 5 - casing of the sylphon bellows; 6 - thermorelay; 7 - central perforated tube; 8 - perforated network; 9 - gas discharge tube

supply of gas connected with the valve by the sylphon bellows. This gas supply is filled with a liquid having a low boiling temperature, for example, Freon. To increase the space factor of the tank and insure takeoff of the gas with any position of the space suit, a central perforated tube and a perforated distributing network are mounted on the tank. A gas discharge tube is located inside the perforated tube. The upper rim of this discharge tube is positioned in such a way that any plane passing through the center of the discharge tube divides the tank into two parts equal in volume. Orig. art. has: 1 figure.

SUB CODE: 06, 22/ SUBM DATE: 31Jul64

Card 2/2

RYBALKO, A.T.; KAPUSTYANSKAYA, V.G.; OSOVSKIY, A.I.

Operational experience with coal centrifuging machines at the Komsomolets Central Coal Preparation Plant. Koks i khim. no.5:14-16 '60. (MIRA 13:7)

1. TSentral'naya obogatitel'naya fabrika Komsomolets. (Stalino (Stalino Province)—Coal preparation)

S/139/60/000/005/028/031
E073/E135

AUTHORS: Rybalko, F.P., and Rybalko, B.F.

TITLE: Growing a Single Crystal Foil with a Given Crystallographic Orientation

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, No. 5, pp 169-170

TEXT: The authors have developed the following method of growing thin single zinc-foil crystals with an orientation such that the base plane is parallel to the normal of the plane of the strip or coincides with the foil plane. From the zinc foil 0.02 mm thick strips, 80 mm long and 10 mm wide, were cut. One end of the strip was cut by shears to form a wedge with an opening angle of about 30°. Following that, the strip was placed between two glass plates which were cut from thin straight glass, 180 mm long, 12-14 mm wide. The two plates were tied together with wire and from the bottom end heating was applied by a burner and both were twisted so as to obtain strips with a relative shift of the two ends with respect to the longitudinal axis by 90°. They were then taken apart and the inside was covered with kerosene soot. The zinc foil was then placed on the longer straight part of one
Card 1/3

S/139/60/000/005/028/031
E073/E135

Growing a Single Crystal Foil with a Given Crystallographic Orientation

of the plates with the sharp end located at the twisted spot on the glass strips. To this sharp end a very narrow "transition bridge" of 2 mm width was placed, which was also twisted by 90° along the axis and reached to the shorter part of the plate which was twisted by 90° relative to its main part. To the bridge a seed was applied which was obtained by chipping, at the liquid-nitrogen temperature, from an earlier-grown large zinc single crystal. Then the second plate was put into position very carefully and both were again tied with thin wire. The entire set-up was then placed into a probe with molten zinc which, in turn, was located in a metallic container and the space between the walls was filled with fine sand. By means of a clockwork mechanism the container was lowered into a tubular electric furnace with a temperature above the fusion temperature of zinc. When the container was moved into the colder zone, crystallization occurred and a single crystal grew. The glass plates were placed into molten zinc to prevent oxidation, since there could be little oxygen between the two plates. A vacuum could not be used due to

Card 2/3

S/139/60/000/005/028/031
E073/E135

Growing a Single Crystal Foil with a Given Crystallographic Orientation

sublimation of the zinc. The described method enabled obtaining single-crystal strips not thinner than 0.02 mm. A further reduction in the thickness was obtained by careful etching of the surface with acid. It was found that transverse etching occurred frequently and on etching down to 0.01 mm numerous small holes could be observed which ran right through the material. This can be due to microscopic distortions of the lattice during the crystal growth and it may also be due to the fact that the used glass strips had microscopic nonuniformities.

ASSOCIATION: Ural'skiy gosuniversitet imeni A.M. Gor'kogo (Ural'sk State University imeni A.M. Gor'kiy)

SUBMITTED: January 12, 1960

Card 3/3

80891

S/126/60/009/06/019/025
E073/E335

18.8200

AUTHORS: Rybalko, F.P., Nesterov, A.F. and Rybalko, B.F. 26

TITLE: Distribution of the Nonuniformities of Plastic Deformation. IV. Orientated Work-hardening and its Dependence on the Deformation Temperature

PERIODICAL: Fizika metallov it metallovedeniye, 1960, Vol 9, Nr 6, pp 927 - 931 (USSR)

ABSTRACT: In studying the distribution of the deformation along the length of specimen subjected to cyclic alternating torsion, it was established (Refs 1,2) that in the case of torsion of tubular single and polycrystalline specimens the plastic deformation is nonuniformly distributed; a part of the sections become more intensively deformed for deformation in one direction, whilst other parts become more intensively deformed if the deformation is in the other direction. In changing the sign of the deformation, the magnitude of the nonreversible deformation depends on the effect of the orientated work-hardening, which should decrease with increasing deformation temperature. The aim of the work described in this paper was to investigate in greater detail the dependence of the directional

Card1/3

80891

S/126/60/009/06/019/025
E073/E335

Distribution of the Nonuniformities of Plastic Deformation. IV. Orientated Work-hardening and its Dependence on the Deformation Temperature

work-hardening on the frequency, amplitude and temperature of deformation. The experiments were carried out on copper polycrystalline specimens, consisting of hollow cylinders of 6 mm external and 4 mm internal diameter, 100 mm long. It was experimentally established that the orientated work-hardening manifests itself most strongly in the initial stage of alternating torsion. With increasing deformation amplitude the limit value of the nonreversible deformation increases and so does the average intensity of the orientated work-hardening. At amplitudes of 0.1 g and higher the increase of both magnitudes stops. The maximum possible intensity of increase of the nonreversible deformation for each cycle increases to 20% with increasing amplitude and then decreases. An increase of the frequency of the cycles brings about a decrease in the intensity of the orientated work-hardening. With increasing deformation temperature, the magnitude of the residual deformation does not change

Card2/3

80891

S/126/60/009/06/019/025
E073/E335

Distribution of the Nonuniformities of Plastic Deformation. IV. Orientated Work-hardening and its Dependence on the Deformation Temperature

the average intensity of the orientated work-hardening will increase slightly and the maximum possible intensity of the orientated work-hardening increases intensively up to 200 °C and then decreases. The graphs, Figures 1-3, show the test results obtained on specimens deformed at room temperature; the graphs, Figure 4, give the test results obtained at more elevated temperatures. The low maximum intensity at room temperature is attributed to an elastic reversal of the deformation, which ceases progressively with increasing temperature. At elevated temperatures, the maximum intensity of the orientated work-hardening decreases and this is attributed to an increase in the effect of the thermal softening. There are 4 figures and 3 Soviet references.

ASSOCIATION: Ural'skiy gosudarstvennyy universitet imeni A.M. Gor'kogo (Ural State University imeni A.M. Gor'kiy)

SUBMITTED: January 8, 1960

Card 3/3

PAVLOV, Aleksandr Ivanovich; POTING, Yekaterina Leonidovna; BAYKOV, D.I., retsenzent; RYBALKO, B.V., retsen$_z$ent; KUSKOVA, A.I., red.; TSAL, R.K., tekhn. red.

[Use of aluminum alloys in shipbuilding] Primenenie aliuminievykh splavov v sudostroenii. Leningrad, Gos. soiuznoe izd-vo sudostroit. promyshl., 1961. 290 p. (MIRA 14:11)
(Shipbuilding--Equipment and supplies) (Aluminum alloys)

POKHODUN, Timofey Dmitriyevich; KARELIN, V.F., retsenzent; POKHVALOV, Ye.P., retsenzent; RYBALKO, B.V., nauchn. red.; VLASOVA, Z.V., red.

[Standardization in shipbuilding] Standartizatsiia v sudostroenii. Leningrad, Sudostroenie, 1965. 179 p. (MIRA 18:7)

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

Dependence of the coefficient of diffusion of metals upon the size of the grains. V. Bugakov and F. Rybalko. *Tech. Phys.* (U. S. S. R.) 5, 1729-34(1935).—Brass contg. 30% Zn was used to measure the coeff. of diffusion D for monocrystals of brass and for polycryst. samples, size of grain 0.13, 0.37 and 0.48 mm. The coeff. of diffusion rapidly increases with decrease in size of grain, especially in passing from monocrystals to polycrystals. At t = 700° for monocrystals D = 0.08 × 10 [illegible] and for 0.13 mm. polycrystals D = 2.3 × 10 [illegible]. The heat of diffusion for all polycrystals is Q = 18,700 Cal./g. and for monocrystals Q = 24,000 Cal./g. Borders between the metal grains for polycrystals are believed to have crystal nuclei fewer than in the grain itself; the combining forces in the crystal nucleus are weaker. For Zn on a Cu boundary D ≥ 0.5 × 10 [illegible] sq. cm./day and for Zn in a monocrystal of brass D = 0.37 × 10 [illegible] sq. cm./day. F. H. Rathmann

11X

μ

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

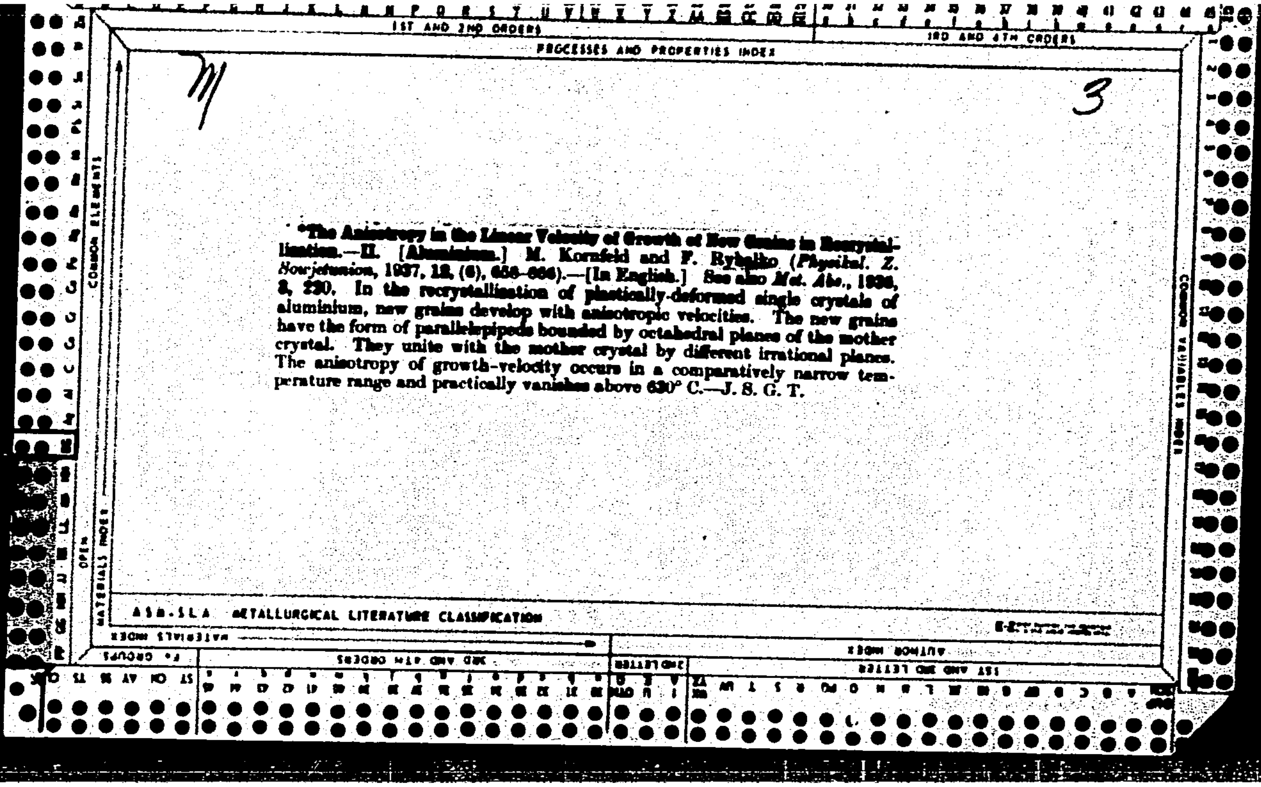
3RD AND 4TH ORDERS

3

m

***Diffusion Coefficients of Metals and Grain Magnitudes.** W. Bugakow and F. Rybalko (*Tech. Physics U.S.S.R.*, 1935, **2**, (6), 617-623; *Sci. Abs.*, 1936, [A], **[illegible]**, 225).—[In German.] This investigation deals with the alteration in the diffusion coeffs. of brass on transition from single- to poly-crystals and for different grain magnitudes in the poly-crystal. The absolute value of the diffusion coeff. increases appreciably during the transformation from single- to poly-crystals. The heat of relaxation, which has been evaluated from the temperature curve of the diffusion coeff., decreases on transition from the single- to the poly-crystal, but remains constant during further diminution of the grain. An explanation of the results is based on the general theoretical presentation of diffusion phenomena. The results are compared with data obtained by electrolytic conductivity measurements.—S. G. ✓

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



1ST AND 2ND ORDERS
3RD AND 4TH ORDERS
PROCESSES AND PROPERTIES INDEX
COMMON ELEMENTS
MATERIALS INDEX
OPEN
COMMON VARIABLES INDEX
AUTHOR INDEX
1ST AND 2ND LETTER
2ND LETTER
Fe GROUPS

M/

3

*The Anisotropy in the Linear Velocity of Growth of New Grains in Recrystallisation.—II. [Aluminium.] M. Kornfeld and F. Rybalko (*Physikal. Z. Sowjetunion*, 1937, 12, (6), 656–666).—[In English.] See also *Met. Abs.*, 1936, 3, 230. In the recrystallisation of plastically-deformed single crystals of aluminium, new grains develop with anisotropic velocities. The new grains have the form of parallelepipeds bounded by octahedral planes of the mother crystal. They unite with the mother crystal by different irrational planes. The anisotropy of growth-velocity occurs in a comparatively narrow temperature range and practically vanishes above 630° C.—J. S. G. T.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

RYBALKO, F. P.

Amelioration of Transformer Steel by the Method of Double Thermomechanical Processing.

Ural State University imeni Gorkiy, Sverdlovsk, 1946.

So: U-1837, 14 April 52.

RYBALKO, F. F.

3

① Met.

B. T. R.
Vol. 3 No. 4
Apr. 1954
Metals-Mechanical and Physical Properties

5345* Plastic Deformation and Fracture During Torsion. (Russian.) [redacted] Doklady Akademii Nauk SSSR, v. 93, no. 3, Nov. 21, 1953, p. 471-473.
Investigations were devoted to study of connection between plasticity of metals and appearance of macro-evidence of deformation. Graph. 7 ref.

EH
6-16-54

KOLESNIKOV, G.N.; RYBALKO, F. P.; YAKUTOVICH, M.V.

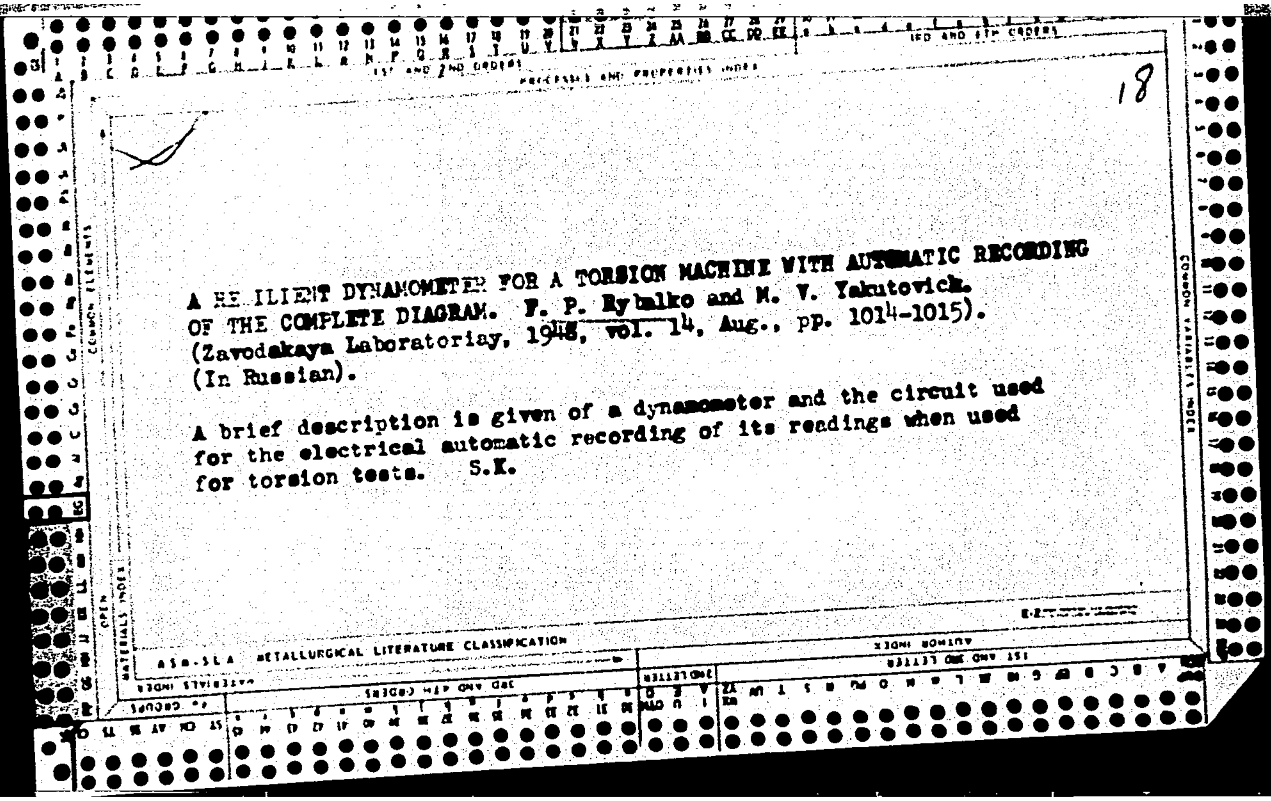
Simple Elastic Dynamometer for a Torsion Machine

Zavod Labor No. 13, 1947

CA

Use of the recrystallization texture and grain coarsening for improvement of transformer steels. F. P. Mybalko and M. V. Yakutovich (Ural. Filial Akad. Nauk S.S.S.R., Sverdlovsk). *Zhur. Tekh. Fiz.* 17, 1503-12(1947).— Specimens of transformer steel contg. 3.58 and 4.2% Si were subjected to cold-rolling (10-70% reduction), heat-treated at 700-1100°, and the coercive force and permeability detd. Optimum properties in 4.2% Si steel were obtained by 60-70% cold reduction, recrystn. at 1000° for 40-90 min., followed by 4-6% cold reduction and recrystn. at 1000° for 3-4 hrs.; this resulted in a grain size of 3-5 mm. and a coercive force of 0.24 oersteds. For 3.58% Si steel, the optimum treatment was similar, except that only 24-40 min. was required for the first recrystn.

H. W. Rathmann



18

A RESILIENT DYNAMOMETER FOR A TORSION MACHINE WITH AUTOMATIC RECORDING OF THE COMPLETE DIAGRAM. F. P. Rybalko and M. V. Yakutovich. (Zavodskaya Laboratoriay, 1948, vol. 14, Aug., pp. 1014-1015). (In Russian).

A brief description is given of a dynamometer and the circuit used for the electrical automatic recording of its readings when used for torsion tests. S.K.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND GROUPS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH GROUPS

5A

AE3

SS

539.379 : 548.0 : 539

1201. **Deformation of the aluminium crystals.** RYBALKO, F. P. AND YAKUTOVICH, M. V. *J. Tech. Phys., USSR*, 10, 915-19 (*July*, 1940) *In Russian*.—Some Al crystals, after extension by 7-15%, exhibit an orientation different from that of the original crystal in a certain region. The crystal, as it were, is divided into two parts differently affected by the deformation. With increasing tensile strain the region referred to becomes ever more sharply delineated, and grows, to occupy in the end about half of the crystal. The relative orientation is changed towards an aspect approaching the formation of a "mechanical twin," as previously observed by Elam [Abstr. 591 (1929)]. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

Brit Abs

Metal.

Distribution along the axis of the distortion of a test piece by torsion. M. V. Yakutovich and F. P. Rybalko (*C. R. Acad. Sci. URSS*, 1948, **60**, 227—229).—Curves show the distribution along the axis of the distortion by torsion of cylindrical test-pieces of steel tempered at [illegible]°, and of 70 : 30 brass. For steel the max. distortion is 7 times, for brass only 1·7 times the mean. This is due to the difference in plasticity.

A. H. Denbham.

RYBALKO, F. P.

PA 11/49T79

Jul 48

USSR/Metals
Stress Analysis
Plastic Deformation

"Plasticity of Steel During Deformation by Tension and Torsion," M. V. Yakutovich, F. P. Rybalko, Inst of Metallophys, Ural Affiliate, Acad Sci USSR, Sverdlovsk, 2 pp

"Dok Ak Nauk SSSR" Vol LXI, No 2

Determines maximum tensile and shear stresses for E-10 steel and "Khromasil'," cooled to various temperatures. Plots results. Submitted 4 May 48.

11/49T79

RYBALKO, F. P.

FA 29/49T73

USSR/Metals
Steel - Plastic Deformation
Surface Finishes

Feb 49

"The Plasticity of Steel and Finishing of Surfaces," F. P. Rybalko, M. V. Yakutovich, Inst Phys of Metals, Ural Affiliate, Acad Sci USSR, 2 pp

"Dok Ak Nauk SSSR" Vol LXIV, No 5

Experimentally shows that the plasticity of a material depends greatly on the purity obtained in processing the surface. Submitted by Acad I. P. Bardin, 15 Dec 48.

29/49T73

RYBAIKO, F.P.

USSR.

Effect of cleanness of the milled surface on the plasticity of steels during torsion testing. F. P. Rybalko and M. V. Yakutovich. *Zhur. Tekh. Fiz.* 23, 708-10 (1953).—It was found that small graduation lines, statistically distributed on the surface of a steel sample undergoing torsion, have a great effect on the plasticity of steels, even when the deformation to destruction is measured in tenths of a per cent.

Gladys S. Macy

RYBALKO, F.P.

USSR.

The localization of deformation and the determination of the plasticity of steels during torsion and tension. F. P. Rybalko and M. V. Yakutovich. *Zhur. Tekh. Fiz.* 23, 771-8(1953).—For the first time, the discontinuity of the distribution of deformation along the length of a sample of steel during torsion was established. An explanation was given for the discrepancy between the conventional max. shear detd. by torsion expts., and the max. shear detd. by tension expts. Gladys S. Macy

RYBALKO, F. P.

1NM7

Journal of the Iron and Steel Inst.
June 1954
Properties and Tests

Plastic Deformation and Failure During Torsion. F. P. Rybalko. (*Doklady Akademii Nauk S.S.S.R.*, 1953, 93, (3), 471–473). [In Russian]. The problem of the relation between the beginning of physical softening and the appearance of macrocracks or failure was investigated using steel 45-KhNMFA. Torsion tests under load to complete failure were made using a series of test pieces of varying plasticity obtained by tempering at different temperatures (between 100 and 650° F.) specimens previously quenched in oil from 900° C. The deformation zone of all test pieces was well polished. The use of chemical colouring enabled cracks 1–1·5 mm. wide and 5–10 mm. long to be observed. From experimental evidence it is concluded that: (1) In plastic materials the process of physical softening commences in the early stages of plastic deformation; (2) the amount of relative r up before the appearance of zones of local deformation can characterize the beginning of the process of destruction, and may be considered as a new mechanical property for a given material.—V. G.

10-11

RYBALKO, F. P.

113/105 539.414

Ultimate Stress in the Torsional Deformation of an Isotropic Material

F.P. Rybalko, V.K. Farafonov

Dokl.Akad.Nauk
93(4),651-654
1953
U.S.S.R.

Index
Aeronauticus
May 1954
Strength of
Materials

Experiments are described intended to verify the theory of Yakutovich that failure of a material under load is always due to normal stresses, and that the conventional classification into 'rupture' failure and 'shear' failure does not represent the true microstructural development. In a perfectly isotropic substance such as perspex, the fracture surfaces in fact show initial cracks oriented at 45 degrees to the axis, i.e. due to normal stresses. The observed, apparent shearing failure, is due to the secondary appearance of macroscopic cracks; the fracture face consists of a number of radiating 'facets' in each of which rupture has taken place under normal stress. The theory is applicable, with suitable corrections, to crystalline and anisotropic materials. (Bibl.4)

Rybalko, F. P.

Plastic deformation and fracture of metallic poly- and monocrystals under static and cyclic torsion. F. P. Rybalko. *Fiz. Metal. i Metalloved.* 1, 231-8(1955).—Processes of plastic deformation start with microcenters of failure that eventually develop into macro characteristics of it. Some information on the mechanism involved can be obtained by a study of the relation between plasticity and indications of destruction in the stages preceding the appearance of visible fissures. This was done by torsionally straining polished wires of poly- and monocryst. metals either statically or cyclically and studying them under a microscope. At any static deformation velocity the deformation originally proceeds uniformly all over the sample, and after reaching some given deformation becomes concd. in a narrow ring zone 1.5-2 mm. wide which decreases with higher deformation speed. In cyclic torsion of ductile metals, stress concn. is localized in parallel axial bands caused by shearing stresses, ultimately resulting in axial cracks. With an increased no. of cycles, parallel axial bands become supplemented by transverse fissures. Deformation and failure in torsional loading are defined by an athermal strengthening, phys. weakening, and thermal weakening. J. D. Gat

RYBALKO, F.P.

(4E2c)

Plastic Deformation and Hardening under Cyclic Stresses. F. P. Rybalko (*Fizika Metallov i Metallovedenie*, 1956, 2, (2), 376-377).—[In Russian]. A letter. Longitudinal marks were made on single- and poly-cryst. Cu. When cyclic torsional stresses were applied the marks turned into a "herringbone" pattern with 3-4 zones along the length of the specimen. As the number of cycles increased the angle between the marks in successive zones increased, but the number of zones stayed const. That is, successive zones were being bent in opposite directions, alternate zones deforming as the stress changed direction. The Bauschinger effect cannot be considered only in relation to the deformation of parts of individual grains. Rather one must consider the deformation of micro- or macro-zones. Also, since in each zone deformation takes place only when the stress is in the appropriate direction, dislocations in each zone can run only in one direction. Those dislocations which respond to the reversed stress are in another part of the specimen.—A. F. B.

RYBALKO F.P.

E-9

Category : USSR/Solid State Physics - Mechanical Properties of Crystals and Crystalline Compounds

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6803

Author : Rybalko, F.P.
Inst : Ural' University, USSR
Title : Concerning the Problem of Plastic Deformation and Strengthening in a Sign-Reversing Deformation.

Orig Pub : Fiz. metallov i metallovedeniye, 1956, 2, No 3, 376-377

Abstract : Copper hollow single and polycrystalline cylinders, subjected to sign-reversing torsion in strictly symmetrical cycles, experience an unequally deformed plastic deformation, during which various parts of the specimen are deformed and strengthened not simultaneously, but in sequency. The extreme sections, adjacent to the clamps of the machine, are deformed when twisted in one direction only while the middle part is not deformed at that time; when the sign of the deformation is reversed, the middle part begins deforming, while the extreme parts remain unchanged. The distribution of deformation along the specimen was determined from the twist

Card : 1/2

Category : USSR/Solid State Physics - Mechanical Properties of Crystals and Crystalline Compounds E-9

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6803

angles of scribe marks drawn before the test parallel to the generatrix of the cylinder, and also from the appearance of sharply bounded regions of different shade on the surface of the specimen. The cause of such a separation of cylinders into regions is in this case the different degree of deformation and strengthening of the middle and extreme parts of the specimens.

Card : 2/2

RYBALKO, F.P.

1 2 (4E2d)
2 (4E4c)

Struct
Met

Fragmentation of the Surface of Polycrystalline Metals by Alternating Torsion. F. P. Rybalko (*Fizika Metallov i Metallovedenie*, 1956, 2, ~~(3), 51[illegible]~~). [In Russian]. Polycryst. specimens of Cu, Brass, Al, Pb, Sn, Zn, Zn–20% Al, Zn–30% Al were deformed by alternating torsional stresses at various amplitudes and frequencies. In all cases the onset of ductile fracture was marked by the fragmentation of the surface into rectangular blocks bounded by microcracks. The direction of the cracks corresponded to the directions of principal stress. Polishing scratches played no part in determining the fragmentation pattern neither did the grain structure nor crystal structure of the metal. The fragmentation is illustrated; some specimens of Zn and Sn resemble the parts of a jigsaw puzzle.—A. F. B.

18

JKM

RG KW

RYBALKO, F.P.

USSR/Crystals. B-5

Abs Jour : Referat Zhur - Khimiya, No 6, 1957, 18373

Author : F.P. Rybalko
Inst : ———
Title : To The Question Regarding The Anisotropy of Crystal Growth Speed.

Orig Pub : Fiz. metallov i metallovedeniye, 1956, 3, No 1, 184-185.

Abstract : It was found at an X-ray study of a monocrystal of Al (99.98%), grown in a melt, that the crystal growth speed in different directions depends on the temperature in different ways.

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RYBALKO, F.P.

USSR / Mechanical Properties of Crystals and Polycrystallic Compounds. E-9

Abs Jour : Ref Zhur - Fizika, No 4, 1957, No 9459

Author : Rybalko, F.P.
Title : Concerning the Problem of the Macromechanism of Destruction.

Orig Pub : Izv. metallov i metallovedeniye, 1956, 3, No 1, 185-186

Abstract : The author establishes the influence of the degree of plasticity on the character of the macrosurface of destruction by tension of solid cylindrical specimens prepared of fine grain steel of the 45 KhMNFA type. The different degree of plasticity was reached by tempering the hardened specimens at various temperatures in a neutral medium.

Card : 1/1

Rybalko, F. P.

3

Maximum plasticity of metals and alloys as a function of frequency and deformation amplitude in alternating twisting. [illegible] P. Rybalko, G. V. Mirolyubov, and N. N. [illegible]. *Metalloved* 3, 341-8(1956).--Round [illegible] of [illegible] Al, and Al-Zn alloys 80 mm long [illegible] were twisted in both directions [illegible] amplitudes of the angle of twist (between [illegible] and [illegible] between 0.02 and 8 cycles sec [illegible] failure. Diagrams presenting [illegible] plasticity (given as the no. of cycles before failure) show that different combinations of these factors affect it greatly. The process of plastic deformation and failure during cyclic twisting is connected with athermal strengthening, thermal and phys. softening, and capability for localized deformations. The participation of these basic factors is not const. but depends on the relation between the amplitude and frequency of each test. Unsatd. solid solns. might be occasionally changed to satd. by deformation and effect the max. plasticity of the alloy through aging. Max. plasticity responds to the amplitude of deformation in a parabolic law, increasing with frequency for pure metals and decreasing for solid solns.

I. D. Gat

SOV/137-58-11-23396

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 11, p 221 (USSR)

AUTHOR: Rybalko, F. P.

TITLE: Nonuniformities in the Distribution of Plastic Deformations and the Oriented Characteristics of Hardening (Neravnomernosti raspredeleniya plasticheskoy deformatsii i oriyentirovannost' uprochneniya)

PERIODICAL: V sb.: Issled. po fiz. tverdogo tela. Moscow, AN SSSR, 1957, pp 174-183

ABSTRACT: Statistical methods were employed to study the nature of distribution of deformations (D) in the case of macroscopically homogeneous and nonhomogeneous alternating fields of stress. The magnitude of the D was determined from changes occurring in the dimensions of reference grids superimposed on the surface of the specimens (S) and having different base lengths (BL). In the first instance, commercial electrical Al was employed in the preparation of flat, coarse (grains of 16-20 mm in diameter) and fine-grained (grains of 1-1.5 mm in diameter) S with dimensions of 5x40x150 mm. The coarse-grained S were elongated by 6.3%, the fine-grained by 9%. The new dimensions of the grid squares were measured with an accuracy of 0.001 mm

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SOV/137-58-11-23396

Nonuniformities in the Distribution of Plastic Deformations (cont.)

with the aid of a UIM-21 microscope. BL of 0.2, 1, 2, 4, and 5 mm were used in measuring the D. Tubular copper S were subjected to macroscopically nonhomogeneous alternating D at various amplitudes and frequencies achieved on a standard machine for the torsion testing of wires. The dimensions of the S were as follows: Inner diameter 4 mm; outer diameter 6 mm; effective length 60 mm; length of clamped ends 20 mm each. A number of fine graduation lines were placed at 1-mm intervals on the surface of the S perpendicularly to its axis. The S were preliminarily subjected to two hours of annealing in an inert atmosphere at a temperature of 500°C. The local nature of the distribution of D was substantiated and it was established that in certain volumes the D is 4-5 times greater than the average D of the S. The D in a portion of these volumes was found to be of opposite sign. As the BL is reduced, the deviation from the average D increases while the number of volumes characterized by maximum and minimum D tends to diminish. As the BL is successively increased, the regions exhibiting an average value of D increase continuously in number. Within the boundaries of a single grain the distribution of the D is just as nonuniform as it is in a polycrystalline S. Tubular polycrystalline S consist of regions which deform predominantly under D of identical orientation, a condition which is brought about by the oriented characteristics of hardening. In this instance the distribution of the D is macroscopically nonuniform both with

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SOV/137-58-11-23396

Nonuniformities in the Distribution of Plastic Deformations (cont.)

respect to magnitude of displacement of individual regions and with respect to the volume occupied by these regions.

T. M.

Card 3/3

RYBALKO, F P.

126-3-9/34

AUTHORS: Rybalko, F. P. and Yakutovich, M. V.

TITLE: Stable and non-stable macro-localisation of the plastic deformation in the case of static torsion. (Ustoychivaya i neustoychivaya makrolokalizatsiya plasticheskoy deformatsii pri staticheskom kruchenii).

PERIODICAL: "Fizika Metallov i Metallovedeniye" (Physics of Metals and Metallurgy), 1957, Vol.4, No.3, pp.450-454 (U.S.S.R.)

ABSTRACT: This paper is devoted to describing the phenomenon of unstable localisation of the plastic deformation during static torsion and its relation with stable localised deformation. In addition, a number of problems are discussed on the basis of literature on localised plastic deformation. The experiments consisted in investigating deformation by static torsion of carefully polished cylindrical specimens with a constancy of the size of the active diameter of 0.017 to 0.03% by means of a method described in earlier work of the authors (3-6). The specimens were made of Steel Э10 and 34ХНМФА tempered at various temperatures, as described in earlier papers (3-5). It is concluded that during plastic deformation and during macro-shear failure two types of localised deformation can be detected, stable and unstable deformation. The physical cause of unstable

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126-3-9/34

Stable and non-stable macro-localisation of the plastic deformation in the case of static torsion. (Cont.)

SUBMITTED: June 27, 1956.

ASSOCIATION: Ural State University imeni A. M. Gorky.
(Ural'skiy Gosudarstvennyy Universitet imeni A.M.Gor'kogo).

AVAILABLE: Library of Congress

Card 3/3

SOV/163-58-2-39/46

AUTHOR: Rybalko, F. P.

TITLE: The Macro and Micro Symptoms of Destruction (Makro- i mikropriznaki razrusheniya)

PERIODICAL: Naucnnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 2, pp. 214 - 219 (USSR)

ABSTRACT: The character of the distribution and the orientation of the cracks and fissures formed in metallic alloys were investigated. Purest copper and α-brass of different zinc content (6,4%, 12,4%, 20,0% and 30%) were used for this investigation. Five basic types of destruction occur: especially plastic, plastic, plastic-brittle, brittle, and especially brittle. In the deformation of the alloys also a transition from one type of destruction to the other occurs. The first and second type of destruction (especially plastic and plastic) are determined by macro symptoms, especially by the change of the form of the cracks. The two last mentioned types of destruction (brittle and especially brittle) may be determined by the cracks occurring which in their final stage have macroscopic dimensions. The brittle-plastic destruction is characterized

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The Macro and Micro Symptoms of Destruction SOV/163-58-2-39/46

by macro and micro symptoms. In alloys with 12.4%zinc mainly plastic, brittle-plastic and brittle destruction occur. In alloys with 20% zinc a transition from the plastic destruction to the brittle destruction may be found. Brass with 30% zinc is characterized by the transition from the especially plastic to the brittle destruction. At the beginning of the destruction in copper alloys with high tin content structural changes occur which influence the plasticity of the alloys. All external symptoms of destruction (change of the form with specific distribution and orientation of the cracks) make it possible to determine the type of destruction by means of the macro and micro method. There are 4 figures and 9 references, 9 of which are Soviet.

ASSOCIATION: Ural'skiy gosudarstvennyy universitet (Ural State University)

SUBMITTED: October 1, 1957

Card 2/2

SOV/139-58-6-13/29

AUTHOR: Rybalko, F.P.

TITLE: Distribution of Inhomogeneous Plastic Deformation. I (Raspredeleniye neodnorodnostey plasticheskoy deformatsii. I)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, 1958, Nr 6, pp 79-84 (USSR)

ABSTRACT: A simple statistical model is proposed and tested experimentally, for the assessment of the distribution of inhomogeneous plastic deformations in mono- and polycrystalline metals. In the model postulated the whole volume of the metal is considered divided into $n = n_1 + n_2 + \ldots + n_i$ elementary volumes, each of which is characterised by a given deformation function. Thus n_1 cells have deformation function H_{01}; n_2 have deformation function H_{02} and so on; with $H_{01} = H_{02} = \ldots H_{0i}$. These functions will not of course all be additive but one can define a certain function $H_0 = f(H_{01}, H_{02}, \ldots H_{0i})$ which gives the "microscopic" non-uniformity of plastic deformation. The macroscopic non-uniformity of plastic deformation S will be a function of H_0 and

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another function H_C which measures the bodily movements of the various cells in relation to some fixed coordinate system. The detailed theory of such a statistical model is not developed but experimental results are presented which indicate the maximum size of the elementary cell which is consistent with the model's yielding a reasonable macroscopic distribution of plastic deformation. Metallographic measurements of deformations in a large number of cells were made for the following elementary cell dimensions: 0.2 mm; 1.0 mm; 2.0 mm and 5.0 mm. The metal used for these experiments was polycrystalline "electrotechnical" aluminium. A set of fine (0.001 mm wide and deep) lines was ruled at distances of 0.1 mm apart on polished strips of aluminium. Another set of such lines was ruled at right angles to the first set. The resulting grid of 0.1 x 0.1 mm squares was used as the basis of the cells, e.g. four 0.1 x 0.1 mm squares were taken as one 0.2 x 0.2 mm cell and so on. The strips were deformed by 9% extension at room temperature and changes in dimensions (extension or contraction) of the elementary cells were measured under a microscope. These changes

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Distribution of Inhomogeneous Plastic Deformation. I

(strains) in two perpendicular directions, are plotted as frequency distributions in Fig 1 and 2. For the particular metal used (grain size 1.0 to 1.5 mm) it appears that 2mm is about the maximum cell dimension which can be used. The strain-frequency distributions for smaller cells than 2 mm have the same mode and vary only in their spread; the distribution for the 5 mm cells, however, showed a significant modal displacement. These conclusions do not appear to be affected by the magnitude of the mean total deformation over the range investigated, namely from 3.8% to 9% mean total extension. The investigations will be extended to other metals, mean deformations and temperatures. There are 2 figures and 5 Soviet references.

ASSOCIATION: Ural'skiy Gosuniversitet imeni A.M.Gor'kogo
(Ural State University imeni A.M.Gor'kiy)

SUBMITTED: 14th April 1958

Card 3/3

24(6)

AUTHOR: Rybalko, F.P. SOV/139-59-1-2/34

TITLE: Distribution of Non-Uniformities of Plastic Deformation. II. (Raspredeleniye neodnorodnostey plasticheskoy deformatsii. II)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, 1959, Nr 1, pp 6-14 (USSR)

ABSTRACT: Specimens of aluminium (99.99%) of definite uniform grain size were obtained by cold rolling with a great reduction in area, followed by thermo-mechanical treatment. A rectangular fine-meshed dividing net was applied to the ground surface of specimens by an earlier described method (Ref 1). After deformation of every specimen to a certain definite degree the mesh size in each net was measured and the deformation of each individual compartment was calculated in per cent. 0.2 mm was chosen as the length of the smallest base, and 1.0 mm^2 was chosen as an applicable grain size. The working area was 40 x 200 mm. The results of measurements of the observed distribution of the non-uniformities of plastic deformation are shown in graphs 1 to 8; here the grains have an average diameter of 1.5 mm. In Fig 1, curves representing the distribution of non-uniformities of plastic deformation according to

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SOV/139-59-1-2/34

Distribution of Non-Uniformities of Plastic Deformation. II

data of measurement of the mesh deformation of the dividing net, having a base of 5.0 mm, are shown. Along the ordinate axis the relative (as regards the total number) numbers of compartments with identical deformation are plotted, and along the abscissae the relative deformations of each group of compartments are plotted. Curve I refers to a grouping of compartments in an interval of up to 0.5%. Curve 2 refers to a case when the difference in deformation between separate compartment groups deformed to the same extent is 1.0%. In Figure 2, distribution curves for the non-uniformities of plastic deformation, plotted according to measurements of 3.0 mm compartments of the dividing net, are shown. Here, curves I and 2 refer to the groupings of compartments in intervals of 0.5 and 1.0%, respectively. Curve 3 refers to a grouping of 1.5%. By comparing Figures 1 and 2 it can be seen that the non-uniformity in the distribution of plastic deformation is expressed in greater detail in a finer net. In Figure 3 the results of the measurement of the distribution of non-uniformities of plastic deformation in the same specimen are given, which were obtained by using a dividing net with a base of 0.6 mm.

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Distribution of Non-Uniformities of Plastic Deformation. II

The curves 1, 2 and 3 refer to groupings of compartments according to deformation at 1, 2 and 3%, respectively. In Figure 4 data are shown which were obtained by measuring the deformation of compartments of a net with a base of 0.2 mm. Curves 1 to 6 refer to groupings with 1, 2, 3, 4, 5 and 6% deformation, respectively. From a comparison of Figure 4 with the previous figures it can be seen that in the latter case the propagation of deformation along the compartments at a grouping of 1.0% deformation is more even than with coarser nets. In Figure 5 the influence of the base size of the dividing net on the nature of distribution of the observed plastic deformation is illustrated for a grouping at intervals of 1.0%. Curves 1 to 5 refer to base sizes of 5.0, 3.0, 1.0, 0.6 and 0.2 mm, respectively. In Figure 6 the base sizes are plotted along the abscissae, and the corresponding maximum numbers of compartments with identical deformation are plotted along the ordinate. In Figure 7, the least grouping interval, allowing the description of the distribution of Hc by a smooth curve of the normal Gauss type, is shown in relation to the base size. In Figure 8 data of measurements of the distribution of plastic deformation allowing for the

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Distribution of Non-Uniformities of Plastic Deformation. II

length of the specimen are shown. Curve 1 refers to measurements of deformation through 5 mm of length and Curve 2 through 3 mm. As a result of this investigation the author has arrived at the following conclusions: the degree of non-uniformity and the nature of distribution of plastic deformation develop differently in relation to the base size of the dividing net and the interval in % deformation of compartment groupings under identical deformation. There exists a definite relationship between the size of the net base and the grouping interval which is simple and changes constantly only at a few optimum ratios of these values. The simple and continuous relationship of the optimum ratios between the base size and the grouping interval during transition from coarse bases to bases which are smaller than the grain size changes fundamentally, losing its sensitivity to any change in grouping interval. The existence of optimum ratios between the grouping interval and the net base sizes divides the whole region of distribution of the non-uniformities of plastic deformation into two parts, one of which is 'prohibited' and does not permit a description of the distribution of the non-uniformities

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Distribution of Non-Uniformities of Plastic Deformation. II

of plastic deformation in the form of a smooth curve of the normal Gauss type, and another which allows an approximated continuous distribution function of the plastic deformation to be chosen according to the degree of deformation. There exists between the number of compartments with more probable (average) deformation on the one hand and between the net base size or grouping interval on the other, a definite relationship in the whole region of the distribution of non-uniformities of plastic deformation. From the height of the maximum in the approximated curves of distribution of non-uniformities of plastic deformation it is possible to judge the macroscopic degree of non-uniformity of plastic deformation, and from the 'width' and position of the maximum it is possible to judge the more concrete nature of distribution of plastic deformation in small volumes and its macrolocalisation. Any quantitative determination of the degree and nature of distribution of plastic deformation without indication of the scales of measurement

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Distribution of Non-Uniformities of Plastic Deformation. II

and the accuracy of calculation has no macroscopic sense. There are 8 figures and 1 Soviet reference.

ASSOCIATION: Ural'skiy Gosuniversitet imeni A.M. Gor'kogo (Ural State University imeni A.M. Gor'kiy)

SUBMITTED: April 14, 1958

Card 6/6

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65702

SOV/139-59-2-1/30

AUTHOR: Rybalko, F.P.

TITLE: Distribution of the Non-Uniformities of the Plastic Deformation, Part III.

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1959, Nr 2, pp 3-10 (USSR)

ABSTRACT: In earlier work (Ref 1), the author established that in pure aluminium, deformed at room temperature, the plastic deformation is non-uniformly distributed. It was found that there is a definite relation between the character of the observed non-uniformity of the distribution of the plastic deformation on the one hand and the distance between the lines at the base of the network engraved on the specimen and the interval of grouping of the cells for equal degrees of deformation on the other hand. The author considered it of interest to also study the influence of other factors on the distribution of plastic deformation and, in this paper, the results are described of investigations of the temperature of deformation and of alloying additions to the aluminium. The author used the same technique as was used in the earlier experiments (Ref 1). By engraving a network with various bases, the distribution was studied of the

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SOV/139-59-2-1/30

Distribution of the Non-Uniformities of the Plastic Deformation, Part III

non-uniformities in the plastic deformation of a polycrystalline pure aluminium (99.99%) and of aluminium alloys containing 0.1 and 10% Zn respectively. Pure aluminium specimens were stretched by 7.3% at 400°C, whilst aluminium with 0.1% Zn was deformed at room temperature by 7.5%. Specimens of aluminium containing 10% Zn were deformed at room temperature by only 4.5%, since larger degrees of deformation produce necking; the grain size in all the specimens was of the order of 1.5 to 1.8 mm. On the basis of the results, which are graphed in Fig 1 to 7 and discussed in some detail, the following conclusions are arrived at:
1) Increase of the deformation temperature brings about an increase in the non-uniform distribution of the plastic deformation by reducing the chaotic nature of the density of distribution of various equally deformed volumes.
2) From the point of view of small volumes, slight additions of Zn bring about an increase in the uniformity of the plastic deformation in the aluminium in the inter-crystallite zones. As a result of this, there will be an increase in the fraction of the volume in which the

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Distribution of the Non-Uniformities of the Plastic Deformation, Part III

deformation differs from that pertaining to the intracrystallite space and there will be an increase in the non-uniformity of the plastic deformation in the networks with wide spacings between the lines. 3) In the case of higher Zn contents, not only will the non-uniformity of the distribution of the plastic deformation increase in macroscopic volumes but there will also be an increase in the number of types of non-uniformities which remain individually distinguishable on changing over to the analysis of deformations in specimens on which the lines of the networks are close. 4) Addition of 0.1% Zn to the Al brings about a change in the statistical distribution of the non-uniformities of the plastic deformation but does not disturb the simple relation between the distance between the lines of the network and the maximum number of equally deformed cells which was earlier observed for pure Al. 5) From the point of view of general validity and possibility of comparison of results of quantitative investigations of the distribution of plastic deformation on a microscopic scale, it is necessary to take into

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Distribution of the Non-Uniformities of the Plastic Deformation, Part III

consideration such factors as the magnitude of the distance between the lines of the network, accuracy of determining the deformation, deformation temperature, grain size, concentration of admixtures etc. There are 7 figures and 1 Soviet reference.

ASSOCIATION: Ural'skiy gosuniversitet imeni A.M.Gor'kogo
(Ural State University imeni A.M.Gor'kiy)

SUBMITTED: April 14, 1958

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RYBALKO, F.P.

Distribution of inhomogeneity of plastic deformations. Izv.vys.ucheb. zav.; fiz. no.6:79-84 '59. (MIRA 12:4)

1. Ural'skiy gosuniversitet im. A.M. Gor'kogo.
(Aluminum crystals) (Dislocations in metals)

S/139/60/000/005/028/031
E073/E135

AUTHORS: Rybalko, F.P., and Rybalko, B.F.

TITLE: Growing a Single Crystal Foil with a Given Crystallographic Orientation

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, No. 5, pp 169-170

TEXT: The authors have developed the following method of growing thin single zinc-foil crystals with an orientation such that the base plane is parallel to the normal of the plane of the strip or coincides with the foil plane. From the zinc foil 0.02 mm thick strips, 80 mm long and 10 mm wide, were cut. One end of the strip was cut by shears to form a wedge with an opening angle of about 30°. Following that, the strip was placed between two glass plates which were cut from thin straight glass, 180 mm long, 12-14 mm wide. The two plates were tied together with wire and from the bottom end heating was applied by a burner and both were twisted so as to obtain strips with a relative shift of the two ends with respect to the longitudinal axis by 90°. They were then taken apart and the inside was covered with kerosene soot. The zinc foil was then placed on the longer straight part of one
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Growing a Single Crystal Foil with a Given Crystallographic Orientation

of the plates with the sharp end located at the twisted spot on the glass strips. To this sharp end a very narrow "transition bridge" of 2 mm width was placed, which was also twisted by 90° along the axis and reached to the shorter part of the plate which was twisted by 90° relative to its main part. To the bridge a seed was applied which was obtained by chipping, at the liquid-nitrogen temperature, from an earlier-grown large zinc single crystal. Then the second plate was put into position very carefully and both were again tied with thin wire. The entire set-up was then placed into a probe with molten zinc which, in turn, was located in a metallic container and the space between the walls was filled with fine sand. By means of a clockwork mechanism the container was lowered into a tubular electric furnace with a temperature above the fusion temperature of zinc. When the container was moved into the colder zone, crystallization occurred and a single crystal grew. The glass plates were placed into molten zinc to prevent oxidation, since there could be little oxygen between the two plates. A vacuum could not be used due to
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Growing a Single Crystal Foil with a Given Crystallographic Orientation

sublimation of the zinc. The described method enabled obtaining single-crystal strips not thinner than 0.02 mm. A further reduction in the thickness was obtained by careful etching of the surface with acid. It was found that transverse etching occurred frequently and on etching down to 0.01 mm numerous small holes could be observed which ran right through the material. This can be due to microscopic distortions of the lattice during the crystal growth and it may also be due to the fact that the used glass strips had microscopic nonuniformities.

ASSOCIATION: Ural'skiy gosuniversitet imeni A.M. Gor'kogo (Ural'sk State University imeni A.M. Gor'kiy)

SUBMITTED: January 12, 1960

Card 3/3

80537
S/126/60/009/05/023/025
E021/E335

18.7500

AUTHORS: Rybalko, F.P., Baynov, M.A. and Katanov, L.M.

[redacted]

TITLE: Artificial Growing of Undeformed Single Crystals of a Given Form and Surface Cleanliness

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol 9, Nr 5, pp 796 - 797 (USSR)

ABSTRACT: The substance of the method of growing single crystals with the above requirements is the following. A specimen with the required form and surface purity is prepared mechanically from a polycrystalline sample. In one place it ends with a projecting sharp cone. The specimen is placed with the cone underneath, in a metal container which is filled with finely dispersed powder. The powder is finer than the roughness of the surface of the crystal required. The container is placed in an electric furnace, the centre of which is at a temperature above the melting point of the metal. It is then pulled through the furnace slowly, controlled by a clock mechanism. To extract the single crystal grown in this way, it is sufficient to tap the container lightly. Various metallic oxides can be used as the powder. Aluminium oxide has been used for

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Artificial Growing of Undeformed Single Crystals of a Given Form and Surface Cleanliness

aluminium and zinc oxide for zinc single crystals. The powder is heated to 200 to 300 °C before use to remove moisture. Single crystals of various shapes have been prepared in this way. A zinc single crystal is shown in the photograph. There is 1 figure.

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80891

18.8200

S/126/60/009/06/019/025
E073/E335

AUTHORS: Rybalko, F.P., Nesterov, A.F. and Rybalko, B.F.

26

TITLE: Distribution of the Nonuniformities of Plastic Deformation. IV. Orientated Work-hardening and its Dependence on the Deformation Temperature

PERIODICAL: Fizika metallov it metallovedeniye, 1960, Vol 9, Nr 6, pp 927 - 931 (USSR)

ABSTRACT: In studying the distribution of the deformation along the length of . specimen subjected to cyclic alternating torsion, it was established (Refs 1,2) that in the case of torsion of tubular single and polycrystalline specimens the plastic deformation is nonuniformly distributed; a part of the sections become more intensively deformed for deformation in one direction, whilst other parts become more intensively deformed if the deformation is in the other direction. In changing the sign of the deformation, the magnitude of the nonreversible deformation depends on the effect of the orientated work-hardening, which should decrease with increasing deformation temperature. The aim of the work described in this paper was to investigate in greater detail the dependence of the directional

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Distribution of the Nonuniformities of Plastic Deformation. IV. Orientated Work-hardening and its Dependence on the Deformation Temperature

work-hardening on the frequency, amplitude and temperature of deformation. The experiments were carried out on copper polycrystalline specimens, consisting of hollow cylinders of 6 mm external and 4 mm internal diameter, 100 mm long. It was experimentally established that the orientated work-hardening manifests itself most strongly in the initial stage of alternating torsion. With increasing deformation amplitude the limit value of the nonreversible deformation increases and so does the average intensity of the orientated work-hardening. At amplitudes of 0.1 g and higher the increase of both magnitudes stops. The maximum possible intensity of increase of the nonreversible deformation for each cycle increases to 20% with increasing amplitude and then decreases. An increase of the frequency of the cycles brings about a decrease in the intensity of the orientated work-hardening. With increasing deformation temperature, the magnitude of the residual deformation does not change,

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Distribution of the Nonuniformities of Plastic Deformation. IV. Orientated Work-hardening and its Dependence on the Deformation Temperature

the average intensity of the orientated work-hardening will increase slightly and the maximum possible intensity of the orientated work-hardening increases intensively up to 200 °C and then decreases. The graphs, Figures 1-3, show the test results obtained on specimens deformed at room temperature; the graphs, Figure 4, give the test results obtained at more elevated temperatures. The low maximum intensity at room temperature is attributed to an elastic reversal of the deformation, which ceases progressively with increasing temperature. At elevated temperatures, the maximum intensity of the orientated work-hardening decreases and this is attributed to an increase in the effect of the thermal softening. There are 4 figures and 3 Soviet references.

ASSOCIATION: Ural'skiy gosudarstvennyy universitet imeni A.M. Gor'kogo (Ural State University imeni A.M. Gor'kiy)

SUBMITTED: January 8, 1960

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85045

S/126/60/010/004/015/023
E193/E483

18.8200 2308, 2808, 1146 only

AUTHOR: Rybalko, F.P.

TITLE: On the Problem of Micro- and Macro-Plasticity During Fracture of Polycrystals 16

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol.10, No.4, pp.597-603

TEXT: It is held generally that when a polycrystalline tensile test piece is extended, the macroscopic plastic deformation of the gauge length is uniform up to the point at which necking begins to take place and that the degree of deformation within this range is unequivocally determined by the elongation or reduction area of the gauge length. However, it had been shown earlier by the present author (Refs. 1 to 3) that even during the stage of macroscopically uniform deformation, microscopic non-uniformity of deformation can be observed. At any given moment, the degree of deformation of individual micro-volumes varies. In addition, the micro-volumes characterized by the same degree of deformation at any given moment are not grouped in one area but are non-uniformly distributed throughout the deformed region. The degrees of non-uniformity of micro deformation in respect to (a) its magnitude

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E193/E483

On the Problem of Micro- and Macro-Plasticity During Fracture of Polycrystals

and (b) the spatial distribution of equally deformed micro-volumes, have been denoted by H_c and H_o, respectively. It has been shown (Refs.1,2) that with increasing degree of macroscopically uniform deformation, H_c increases and H_o decreases. It is known also that H_c increases with increasing temperature and that the elongation attained by a given material at the moment when the necking begins is different at different temperatures. This makes it possible to relate H_c and H_o to the degree of macroscopic deformation, as measured by the elongation or reduction in area of the test piece, and the object of the investigation described in the present paper was experimentally to study this relationship. Pure, oxygen-free, polycrystalline copper was chosen as the experimental material. The specimens (length - 500 mm, diameter - 18 m; gauge length - 200 mm), annealed preliminarily at 600°C, were tested to fracture at 20, 200, 300, 400, 500 and 600°C. The moment at which necking began to take place was determined from the maximum on the automatically recorded

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stress/strain diagram. On the basis of the experimental data, curves were constructed showing the variation of the diameter of the broken test pieces with the distance from the plane of fracture (Fig.1) and the temperature dependence of (1) the extrapolated yield point S_o, (2) true breaking stress S, (3) U.T.S., (4) true elongation in the neck, $\ell = \ln (1 - \delta)$, and (5) true elongation at the moment when necking had started to take place (Fig.2). The present author correlates these results with the previously established (Ref.3) relationship between H_o and H_c on one side and macroscopic deformation on the other and reaches the following conclusions: (1) the significance of the macroscopic characteristics of the process of plastic deformation is better understood in the light of the relationship which exists between the macro- and micro-characteristics of the process; (2) the process of the plastic deformation is determined collectively by H_o and H_c; (3) the temperature at which the deformation takes place affects the relationship between H_o and H_c;

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this factor determines the characteristics of macroscopic deformation at a given temperature; (4) the relationship between H_o and H_c corresponding to individual stages of the process of the elastic and plastic deformation can be approximately determined from the characteristics of the macroscopic deformation; (5) H_o can be expressed numerically by counting the number of equally deformed micro-volumes being in contact with each other. There are 3 figures and 5 Soviet references.

ASSOCIATION: Ural'skiy gosudarstvennyy universitet im. A.M.Gor'kogo (Ural State University imeni A.M.Gor'ki)

SUBMITTED: January 7, 1960

Card 4/4

RYBALKO, F.P.; KOSTENKO, A.V.; ZELENIN, L.P.

Effect of tension on plasticity in deformations effected by alternating torsion. Izv.vys.ucheb.zav.; fiz. no.1:24-30 '61. (MIRA 14:7)

1. Ural'skiy gosudarstvennyy universitet imeni A.M.Gor'kogo.
(Plasticity) (Deformations(Mechanics)) (Torsion)

S/126/62/014/006/009/020
E193/E441

AUTHORS: Rybalko, F.P., Klinskikh, N.A., Volkov, S.D.

TITLE: On the linear approximation in the theory of elasticity of polycrystalline aggregates

PERIODICAL: Fizika metallov i metallovedeniye, v.14, no.6, 1962, 857-863

TEXT: The present paper is concerned with the problem of evaluating the degree of approximation which the conditions of quasi-homogeneity introduce in the solution of the statistically generalized problem of determining, from a given set of conditions, the distribution of moments (of at least the first two orders) of the stress and strain components in a polycrystalline body. The first order moments, i.e. the microscopic stresses and strains, are determined by solving equations of the classical elasticity theory. The second order moments can easily be determined if the conditions of quasi-homogeneity are fulfilled, i.e. if the nonlinear (in the statistical sense) equations of the generalized Hooke's law are replaced by linear equations which do not contain any products of random magnitudes. To attain this linearization of the equations of the generalized Hooke's law, it is assumed that

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the coefficients of variation of the elastic constants are negligible in comparison with the coefficients of variation of stresses and strains; as a result, the elastic constants become determinable and the nonlinearity in the Hooke's law disappears. The basic shortcomings of such an approximate solution consist of the fact that identical dispersion of longitudinal and transverse microstresses is obtained for any given macrostresses. In other words, the tensor of the second order central moments of the microstresses and microstrains in a quasi-isotropic medium, under any given load, is "isotropic", similar to the tensor of macroscopic elastic constants. The object of the present investigation was directly to compare the coefficients of variation of strain and elastic constants and to establish to what extent the actual tensor of the second order central moments of microstrains in polycrystalline aluminium differs from the "isotropic" tensor obtained from the approximate solution, based on the conditions of "quasi-homogeneity". The experimental work was carried out on flat cold rolled aluminium specimens with an average grain size of 3 to 5 mm. A network of coordinates with

1 mm spacing was inscribed on the polished surface of the test piece and the dimensions of each cell were measured (with an accuracy of 0.001 mm) before and after extending the test piece to a given degree of uniform plastic macrodeformation. Analytical treatment of the result obtained showed that the coefficient of variation of the elastic constants was small compared with that of the strains and that the actual anisotropic tensor of the second order central moments of microstrains in polycrystalline aluminium differed from the theoretical "isotropic" tensor by no more than 4.5%. Thus, it was shown that in the case of aluminium not only were the conditions of quasihomogeneity fulfilled to a degree sufficient to make the approximate solution of the problem acceptable but the results obtained by this method were sufficiently close to those yielded by experiment. There are 1 figure and 2 tables.

ASSOCIATIONS: Ural'skiy gosuniversitet im. A.M.Gor'kogo
(Ural State University imeni A.M.Gor'kiy)
Ural'skiy politekhnicheskiy institut im. S.M.Kirova
(Ural Polytechnic Institute imeni S.M.Kirov)

SUBMITTED: February 6, 1962

Card 3/3

RYBALKO, F.P.

Statistics of the distribution of plastic deformation heterogeneity and the effect of various factors on it. Issl. po zharoproch. splav. 10:57-63 '63. (MIRA 17:2)

ACCESSION NR: AP4043350 S/0181/64/006/008/2333/2336

AUTHOR: Ry*balko, F. P.

TITLE: Effect of loss of continuity on the statistics of distribution of plastic deformation

SOURCE: Fizika tverdogo tela, v. 6, no. 8, 1964, 2333-2336

TOPIC TAGS: aluminum, plastic deformation, organic glass, stress analysis, strain measurement, grain size

ABSTRACT: The authors investigated the effect of regularly distributed holes occupying a relatively small fraction of the cross section area on the distribution of plastic deformation in fine-grain aluminum, in which the plastic deformation can be reduced to a normal Gaussian type. The purpose of the investigation was to establish the statistical scales of the inhomogeneities, observed in coarse-grain material following clearly pronounced loss of continu-

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ACCESSION NR: AP4043350

ity (F. P. Ry*balko, Izv. Vuzov, Fizika No. 1, 6, 1959). The procedure for preparing the samples, the locations of the holes, and the tests are briefly described. The results show that in the vicinity of macroscopic discontinuities the number of random deformations is several times larger than the average statistical deformation in these locations. In the case of plexiglas, unlike aluminum, the number of volume elements with increased strength is somewhat larger than the mean-statistical value. The results for fine-grain aluminum were qualitatively the same as previously obtained for coarse-grain aluminum. The inhomogeneity in the distribution of the deformation relative to the number of cells in plexiglas is accompanied, as in the case of aluminum, by an inhomogeneous distribution over the volume. A method is proposed for estimating the disturbance to the stationarity of the deformation field by investigating the deformation field produced when discontinuities are introduced artificially. Although a study of large elastic stresses makes it possible to establish the macroscopic stress distribution

ACCESSION NR: AP4043350

in the presence of inhomogeneities, in metals this is made difficult by the low values of elastic deformation. Orig. art. has: 4 figures.

ASSOCIATION: Ural'skiy gosudarstvenny*y universitet im. A. M. Gor'kogo, Sverdlovsk (Ural State University)

SUBMITTED: 14Feb64 ENCL: 00

SUB CODE: SS,MM NR REF SOV: 004 OTHER: 000

Card 3/3

ASATUROV, A.A.; KOMAROVA, V.A.; RYBALKO, F.P.; VOLKOV, S.D.

Moments of plastic microdeformations. Fiz. met. i metalloved. 17 no.5:744-749 My '64. (MIRA 17:9)

1. Ural'skiy politekhnicheskiy institut imeni Kirova i Ural'skiy gosudarstvennyy universitet imeni Gor'kogo.

L 31986-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(k)/EWP(b) Pf-4 IJP(c) JD/HW

ACCESSION NR: AP5008592 S/0126/64/018/005/0758/0761

34

33

B

AUTHOR: Rybalko, F. P.; Kostenko, A. V.

TITLE: Effect of single crystal orientation on ductility during cyclic torsion

SOURCE: Fizika metallov i metallovedeniye, v. 18, no. 5, 1964, 758-761

TOPIC TAGS: crystal, copper, metal ductility, metal elongation

Abstract: The dependence of elongation on the number of cycles in cyclic torsion was studied with single crystals of copper in the form of solid cylinders. It was established that under cyclic torsion the single crystals were elongated even in the absence of external tensile stresses. Elongation depends largely on the orientation of the single crystals. With an increase in the number of cycles, elongation in all cases is the same as when an increase in the external tensile load is applied on cyclic torsion. The results are interpreted crystallographically.

The ductility of single copper crystals up to rupture by cyclic torsion depends on the number of active slip systems favorably located for elongation along the axis.

The greater the number of crystallographic slip systems, which actively participated in deformation by cyclic torsion, the greater the elongation

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ACCESSION NR: AP5008592

attained at the moment of rupture. In this case rupture occurs after fewer cycles than when the number of slip systems is small.

The macroscopic parameters of oriented hardening (maximum and mean intensities of accumulation and breakdown of permanent deformation and the total value of the latter) must depend on the number of active slip systems, since these parameters are associated with elongation from torsion.

The application of external tensile stresses on cyclic torsion of single crystals of copper increases the ductility up to rupture. This increase grows with the number of cycles. Orig. art. has 1 graph.

ASSOCIATION: Ural'skiy gosuniversitet im. A. M. Gor'kogo (Urals State University)

SUBMITTED: 26Sep63 ENCL: 00 SUB CODE: SS, AS

NO REF SOV: 005 OTHER: 002 JPRS

Card 2/2

RYBALKO, F.P.; ZELENIN, L.P.; GUSEV, G.V.; SHEVCHENKO, R.I.

Dependence of the nonrecovery of plastic deformation on the degree of the macroscopic inhomogeneity of its distribution. Izv. vys. ucheb. zav.; fiz. 8 no.6:125-129 '65. (MIRA 19:1)

1. Ural'skiy gosudarstvennyy universitet imeni A.M. Gor'kogo. Submitted September 26, 1963.

L 26383-66 EWT(m)/EWA(d)/EWP(t) IJP(c) JD

ACC NR: AP6012502 SOURCE CODE: UR/0181/66/008/004/1275/1277

50
B

AUTHOR: Mekhontseva, D. M.; Rybalko, F. P.; Volkov, S. D.

ORG: Ural Polytechnical Institute im. S. M. Kirov (Ural'skiy politekhnicheskiy institut); Ural State University im. A. M. Gor'kiy, Sverdlovsk (Ural'skiy gosudarstvennyy universitet)

TITLE: Distribution of elastic deformation in the structure of quasi-isotropic polycrystalline titanium

21

SOURCE: Fizika tverdogo tela, v. 8, no. 4, 1966, 1275-1277

TOPIC TAGS: titanium, polycrystal, crystal structure, crystal deformation, elastic deformation

ABSTRACT: The authors study the distribution of microscopic elastic deformations in large-grained quasi-isotropic titanium specimens. The measurements were made on a specially designed loading device. The specimens were made from VT5-1 titanium alloy in the form of plates measuring 3 × 50 × 300 mm with an average grain size of about 10 mm. The one-dimensional distribution functions for longitudinal and transverse microscopic deformation show an approximately normal distribution density. It is shown that the standard deviation of transverse microdeformations is approximately 33% lower than that of longitudinal microdeformations when the longitudinal macrodeformation

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L 26383-66

ACC NR: AP6012502

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is 0.287%. This means that the tensor of the central moments of the second order is not isotropic, as was previously demonstrated from measurements of plastic microdeformations. Orig. art. has: 2 figures.

SUB CODE: 20/ SUBM DATE: 09Sep65/ ORIG REF: 006/ OTH REF: 000

Card 2/2 CC

RYBALKO, F.P.; KOSTENKO, A.V.

Effect of the orientation of single crystals on plasticity durin
alternating torsion. Fiz.met. i metalloved. 18 no.5:758 N '64.
(MIRA 18:4)

1. Ural'skiy gosudarstvennyy universitet im. A.M.Gor'kogo.

RYBALKO, F.P.; UGAROVA, N.A.

Statistics of the distribution of macrorotation and shear in the tension of large grain aluminum. Fiz. met. i metalloved. 18 no.6:921 D '64. (MIRA 18:3)

1. Ural'skiy gosudarstvennyy universitet imeni Gor'kogo.

L 05702-67 EWT(j)/EWT(m)/T/EWP(v) IJP(c) RM/DS/WW

ACC NR: AP6026355

SOURCE CODE: UR/0237/66/000/005/0027/0030

AUTHOR: Sidaravichyus, I.; Levina, F. A.; Rybalko, G. I.; Sladkov, A. M.; Myl'nikov, V. S.; Kudryavtsev, Yu. P.; Ukhin, L. Yu.

ORG: none

64
60
B

TITLE: Electrophotographic layers with photosemiconducting 15 acetylenic 7 polymeric compounds

SOURCE: Optiko-mekhanicheskaya promyshlennost', no. 5, 1966, 27-30

TOPIC TAGS: electrophotography, organic semiconductor, semiconducting polymer, copper compound, acetylene compound

ABSTRACT: The article reviews reported studies of new electrophotographic layers. Semiconducting organic polymeric compounds containing triple bonds in the conjugation chain (polyynes) have been found to display a high photoelectric sensitivity and very short times of photoeffect relaxation. The structure of these compounds is

$$R-C\equiv C-\left[-C\equiv C-R_1-C\equiv C-\right]_n C\equiv C-R$$

$$-\left[-C\equiv C-R_1-C\equiv C-\right]_n,$$

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UDC: 772.93

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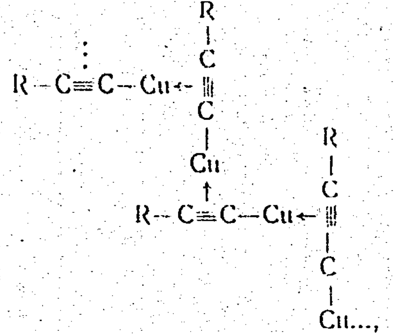
where R and R_1 are organic radicals which may or may not contain functional groups, e. g., R - p-phenyl, p-nitrophenyl, p-iodophenyl, butyl, α-naphthyl, and R_1 - divalent radicals of benzene, azobenzene, anthracene and 9,10-dihydrohydroxyanthracene. A high photoelectric sensitivity has also been observed in copper acetylides of the form



where R are organic radicals which may or may not contain functional groups, e.g., phenyl, nitrophenyl, halogenated phenyl, naphthyl, or butyl. The use of polyvinylcarbazole as a binder for polyynes and copper acetylides has given very good results. Spectral sensitization of the photoconductive effect of the polyynes can be achieved with organic dyes. It is concluded that organic semiconductors are very useful in electrophotography and that highly sensitive electrophotographic layers can be pre-

L 05702-67

ACC NR: AP6026355

pared from them. Authors are sincerely grateful to Academician A. N. Terenin for supervising the work. Orig. art. has: 1 table.

SUB CODE: 14/ SUBM DATE: 01Nov65/ ORIG REF: 010/ OTH REF: 015

Card 3/3

NATAPOV, B.S.; BARZIY, V.K.; OL'SHANETSKIY, V.Ye.; Prinimali uchastiye: FILONOV, V.A., inzh.; YUDIN, M.I., inzh.; IOFFE, M.M., inzh.; POPOV, S.M., inzh.; RYBALKO, G.I., inzh.; ODINETS, L.I., inzh.; SIGALKO, F.V., inzh.; TSIVIRKO, D.Ye.; VOLOSHCHUK, M.D., inzh.

Heat treatment of cold-rolled sheet metal. Stal' 22 no.2:163-165 F '62. (MIRA 15:2)

1. Zaporozhskiy mashinostroitel'nyy institut i zavod "Zaporozhstal'". 2. Zavod "Zaporozhstal" (for Filonov, Yudin, Ioffe, Popov, Rybalko, Odinets). 3. Zaporozhskiy mashinostroitel'nyy institut (for Sigalko, TSivirko, Voloshchuk).

(Sheet steel—Heat treatment)

RYBALKO, G.T., inzh.-mekhanik

Modernization of some parts of the SE-3 excavator.
Gor. zhur. no.6:74-75 Je '62. (MIRA 15:11)

1. Altyn-Topkanskiy kombinat, Almalyk.
(Excavating machinery)

RYBALKO, G.Ye.; MALETSKIY, S.G.

Use of high-frequency channels for train radio communication systems.
Avtom., telem.i sviaz' 6 no.11:34-35 N '62. (MIRA 15:11)

1. Starshiy inzh. laboratorii signalizatsii i svyazi Yuzhnoy dorogi (for Rybalko). 2. Starshiy inzh. Belgorodskoy distantsii signalizatsii i svyazi Yuzhnoy dorogi (for Maletskiy).
(Railroads--Communication systems)
(Railroads--Electronic equipment)

ZRAZHEVSKIY, G.N., kand.tekhn.nauk; RYBALKO, G.Ye., inzh.

Two-way parallel-type amplifier for selector communication circuits. Avtom., telem. i sviaz' 9 no.4:14-16 Ap '65.

(MIRA 18:5)

RYBALKO, I., prepodavatel'

Visual aids in classes on political science. Prof.-tekh.obr. 17
22-23 Mr '60. (MIRA 13:6)

1. Remeslennoye uchilishche No.2, g.Kiyev.
(Political science--Audio-visual aids)

RUTSKIY, I.; RYBALKO, I., prepodavatel' obshchestvovedeniya; TARUD'KO, V.

Readers continue their discussion. Prof. tekh. obr. 21 no.1:24-25 Ja '64. (MIRA 17:3)

1. Sekretar' partiynoy organizatsii tekhnicheskogo uchilishcha No. 2, Vladivostok (for Rutskiy). 2. Direktor Mozhayskogo gorodskogo professional'no-tekhnicheskogo uchilishcha No.25, Moskovskaya obl. (for Tarud'ko).

SHURAK, L.M.; RYBALKO, I.A.; BOROVITSKIY, Ye.V.

Production of cementless slag concrete blocks. Stroi. mat. 9 no.6:20-21 Je '63. (MIRA 17:8)

1. Glavnyy inzh. Donetskogo zavoda stroitel'nykh materialov (for Shurak). 2. Nachal'nik laboratorii i otdela tekhnicheskogo kontrolya Donetskogo zavoda stroitel'nykh materialov (for Rybalko). 3. Glavnyy mekhanik Donetskogo zavoda stroitel'nykh materialov (for Borovitskiy).